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PSYCHOLOGY AND SCIENTIFIC METHODS

THE SUBJECT-MATTER OF METAPHYSICAL INQUIRY

A NUMBER of biologists holding to the adequacy of the mechanistic conception in biology have of late expressed views not unlike those clearly and succinctly set forth in the following quotation: "If we consider the organism simply as a system forming a part of external nature, we find no evidence that it possesses properties that may not eventually be satisfactorily analyzed by the methods of physico-chemical science; but we admit also that those peculiarities of ultimate constitution which have in the course of evolution led to the appearance of living beings in nature are such that we can not well deny the possibility or even legitimacy of applying a vitalistic or even biocentric conception to the cosmic process as a whole."¹

The problems connected with the organism as a part of external nature are referred to in the context of the quotation as scientific problems; those connected with the peculiarities of ultimate constitution as metaphysical. The context also shows that ultimate constitution is conceived in a temporal sense. Metaphysical questions are said to be those having to do with "ultimate origins." Such questions lie quite beyond the application of scientific method. "Why it [nature] exhibits certain apparently innate potentialities and modes of action which have caused it to evolve in a certain way is a question which really lies beyond the sphere of natural science." These "apparently innate potentialities and modes of action" which have caused nature as a whole to evolve in the direction of living beings are identified with "ultimate peculiarities"; and it is with reference to them that the biocentric idea has a possible legitimate application. The argument implies that when we insist upon the adequacy of the physico-chemical explanation of living organisms, we are led, in view of the continuity of evolution of organisms from non-living things, to recognize that the world out of which life developed "held latent or potential within itself the possibility of life." In considering such a

¹ Professor Ralph S. Lillie, *Science*, Vol. 40, page 846. See also the references given in the article, which is entitled "The Philosophy of Biology-Vitalism vs. Mechanism."

world and the nature of the potentiality which caused it to evolve living beings, we are forced, however, beyond the limits of scientific inquiry. We pass the boundary which separates it from metaphysics.

Thus is raised the question as to the nature of metaphysical inquiry. I wish to suggest that while one may accept as a preliminary demarcation of metaphysics from science the more "ultimate traits" with which the former deals, it is not necessary to identify these ultimate traits with temporally original traits—that, in fact, there are good reasons why we should not do so. We may also mark off the metaphysical subject-matter by reference to certain irreducible traits found in any and every subject of scientific inquiry. With reference to the theme of evolution of living beings, the distinctive trait of metaphysical reflection would not then be its attempt to discover some temporally original feature which caused the development, but the irreducible traits of a world in which at least some changes take on an evolutionary form. A world where some changes proceed in the direction of the appearance of living and thinking creatures is a striking sort of a world. While science would trace the conditions of their occurrence in detail, connecting them in their variety with their antecedents, metaphysics would raise the question of the sort of world which *has* such an evolution, not the question of the sort of world which causes it. For the latter type of question appears either to bring us to an *impasse* or else to break up into just the questions which constitute scientific inquiry.

Any intelligible question as to causation seems to be a wholly scientific question. Starting from any given existence, be it a big thing like a solar system or a small thing like a rise of temperature, we may ask how it came about. We account for the change by linking up the thing in question with other specific existences acting in determinate ways—ways which collectively are termed physico-chemical. When we have traced back a present existence to the earlier existences with which it is connected, we may ask a like question about the occurrence of the earlier things, viewed as changes from something still earlier. And so on indefinitely; although, of course, we meet practical limits in our ability to push such questions beyond a certain indefinite point. Hence it may be said that a question about ultimate origin or ultimate causation is either a meaningless question, or else the words are used in a relative sense to designate the point in the past at which a particular inquiry breaks off. Thus we might inquire as to the "ultimate" origin of the French language. This would take us back to certain definite antecedent existences, such as persons speaking the Latin tongue, others speaking barbarian tongues; the contact of these peoples in war, commerce, political

administration, education, etc. But the term "ultimate" has meaning only in relation to the particular existence in question: French speech. We are landed in another historic set of existences, having their own specific antecedents. The case is not otherwise if we ask for the ultimate origin of human speech in general. The inquiry takes us back to animal cries, gestures, etc., certain conditions of intercourse, etc. The question is, how one set of specific existences gradually passed into another. No one would think of referring to latent qualities of the Latin speech as the cause of the evolution of French; one tries to discover actual and overt features which, *inter-acting* with other equally specific existences, brought about this particular change. If we are likely to fall into a different mode of speech with reference to human language in general, it is because we are more ignorant of the specific circumstances under which the transition from animal cries to articulate speech with a meaning took place. Upon analysis, reference to some immanent law or cause which forced the evolution will be found to be a lazy cloak for our ignorance of the specific facts needed in order to deal successfully with the question.

Suppose we generalize the situation still more. We may ask for the ultimate origin of the entire present state of things. Taken *en masse*, such a question is meaningless. Taken in detail, it means that we may apply the same procedure distributively to each and any of the things which now exist. In each case we may trace its history to an earlier state of things. But in each case, *its* history is what we trace, and the history always lands us at some state of things in the past, regarding which the same question might be asked. That scientific inquiry does not itself deal with any question of ultimate origins, except in the purely relative sense already indicated, is, of course, recognized. But it also seems to follow from what has been said that scientific inquiry does not generate, or leave over, such a question for some other discipline, such as metaphysics, to deal with. The contrary conception with respect to the doctrine of evolution is to be explained, I think, by the fact that theology used to have the idea of ultimate origin in connection with creation, and that at a certain juncture it was natural to regard the theory of evolution as a substitute or rival of the theological idea of creation.

If all questions of causation and origin are specific scientific questions, is there any place left for metaphysical inquiry at all? If its theme can not be ultimate origin and causation, is metaphysics anything but a kind of pseudo-science whose illusory character is now to be recognized? This question takes us to the matter of whether there are ultimate, that is, irreducible, traits of the very existences with

which scientific reflection is concerned. In all such investigations as those referred to above we find at least such traits as the following: Specifically diverse existences, interaction, change. Such traits are found in any material which is the subject-matter of inquiry in the natural science. They are found equally and indifferently whether a subject-matter in question be dated 1915 or ten million years B.C. Accordingly, they would seem to deserve the name of ultimate, or irreducible, traits. As such they may be made the object of a kind of inquiry differing from that which deals with the genesis of a particular group of existences, a kind of inquiry to which the name metaphysical may be given.²

It may well seem as if the fact that the subject-matter of science is always a plurality of diverse interacting and changing existences were too obvious and commonplace to invite or reward investigation. Into this point I shall not go, beyond pointing out, in connection with the present theme, that certain negative advantages in the economizing of intellectual effort would at least accrue from the study. Bare recognition of the fact just stated would wean men from the futility of concern with ultimate origins and laws of causation with which the "universe" is supposed to have been endowed at the outset. For it would reveal that, whatever the date of the subject-matter which may be successfully reflected upon, we have the same situation that we have at present: diversity, specificity, change. These traits have to be begged or taken in any case. If we face this fact without squeamishness we shall be saved from the recurrent attempts to reduce heterogeneity to homogeneity, diversity to sheer uniformity, quality to quantity, and so on. That considerations of quantity and mathematical order are indispensable to the successful prosecution of researches into particular occurrences is a

² The name at least has the sanction of the historical designation given to Aristotle's consideration of existence as existence. But it should be noted that we also find in Aristotle the seeds (which, moreover, have at places developed into flourishing growths in his own philosophy) of the conception of metaphysics rejected above. For he expressly gives the more general traits of existence the eulogistic title "divine" and identifies his first philosophy with theology, and so makes this kind of inquiry "superior" to all others, because it deals with the "highest of existing things." While he did not himself seek for this higher or supreme real in time, but rather located it, in its fullness of reality, just beyond space, this identification of existence as such with the divine led to such an identification the moment theology became supremely interested in "creation." But unless one approaches the study of the most general traits of the matter of scientific inquiry with theological presuppositions, there is, of course, no ground for the application to them of eulogistic predicates. There is no ground for thinking that they are any better or any worse, any higher or any lower, than other traits, or that any peculiar dignity attaches to a study of them.

precious fact. It exhibits certain irreducible traits *of* the irreducible traits we have mentioned, but it does not replace them. When it tries to do so it cuts the ground out from under its own feet.

Let me emphasize this point by comment on a further quotation. "If we assume constancy of the elementary natural processes, and constancy in the modes of connection between them—as exact observation forces us to do—there seems no avoiding the conclusion that—given an undifferentiated universe at the start—only one course of evolution can ever have been possible. Laplace long ago perceived this consequence of the mechanistic view of nature, and the inevitability of this conclusion has never been seriously disputed by scientific men. Nevertheless, this is a very strange result, and to many has seemed a *reductio ad absurdum* of the scientific view as applied to the whole of nature."

Note that the inevitable conclusion as to the predetermined course of evolution and the apparent incredibility of the conclusion both depend upon the premise "given an undifferentiated universe at the start." Now this is precisely a premise which a scientific view can not admit, for science deals with any particular existence only by tracing its occurrence to a plurality of prior changing interacting things. Any Laplacean formula would, in any case, be a formula for the structure of *some* existence *in* the world, not for the world as a "whole." The scientific grounds which make it impossible to take the world *en masse* at the present time and to give a comprehensive formula for it in its entirety apply even more strongly, if possible, to some earlier state of affairs. For such a formula can be reached only by tracing back a specific present phenomenon to its specific antecedents.

A curious illusion exists as to formulæ for the ancient states of nature. It is frequently assumed that they denote not merely some absolute original (which is impossible), but also one from which later events unroll in a mathematically predetermined fashion. We seem to be passing in a one-sided way from the earlier to the later. The illusion vanishes when we ask where the formula came from. How was it obtained? Evidently, by beginning with some present existence and tracing its earlier course, till at some time (relevant to the object of the inquiry) we stop and condense the main features of the course into a formula for the structure of the state of things at the date where we stop. Instead of really deducing or deriving the course of subsequent events from an original state, we are simply taking out of a formula the traits which we have put into it on the basis of knowledge of subsequent events. Let the present state be anything you please, as different as may be from what is actually

found, and it will still be true that we could (theoretically) construct a comprehensive formula for its earlier estate. In short, as a matter of fact, a Laplacean formula merely summarizes what the actual course of events has been with respect to some selected features. How then can it be said to describe an original state of nature in virtue of which just such and such things have necessarily happened? A statement that the world is thus and so can not be tortured into a statement of how and why it must be as it is. The account of how a thing came to be as it is always starts and comes back to the fact that it is thus and so. How then can this fact be derived according to some law of predestination from the consideration of its own prior history? For, I repeat, this history is *its* history.³

This discussion, however, oversimplifies matters. It overlooks the extent to which inference as to a prior state of affairs is dependent upon the diversity and complexity of what is now observed. We should be in a hard case in trying to fix upon the structure of the Latin language if our sole datum were, say, the French language. As matter of fact, in considering the growth of the French tongue we have other Romance languages to fall back upon. Above all, we have independent evidence as to the characteristics of Latin speech. If we had not, we should be reasoning in a circle. Science is rightly suspicious of accounts of things in terms of a hypothesis for whose existence nothing can be alleged save that if it existed it would or might account for something which is actually found. Independent evidence of the existence of such an object is required. This consideration has an interesting application to the question in hand. It brings out clearly the absurdity involved in supposing that any formula, of the Laplacean type, about some earlier state of existence, however comprehensive, is comprehensive enough to cover the whole scope of existence of that earlier time.

Let us suppose the formula to be descriptive of a primitive state of the solar system. Not only must it start from and be framed in terms of what *now* exists, but the present datum must be larger than the existing solar system if we are to escape reasoning in a circle. In such cosmological constructions, astronomers and geologists rely upon observation of what is going on outside of the solar system. Without such data, the inquiry would be hopelessly crippled. The stellar field now presents, presumably, systems in all stages of formation. Is there any reason for supposing that a like state of affairs did not present itself at any and every prior time? Whatever for-

³ Compare Woodbridge, "Evolution," *Philosophical Review*, Vol. 21, page 137.

mula is arrived at for the beginning of our present solar system describes, therefore, only one structure existing amid a vaster complex. A state of things adequately and inclusively described by the formula would be, by conception, a state of things in which nothing could happen. To get change we have to assume other structures which interact with it, existences not covered by the formula.

As a matter of fact, the conception of a solar system seems to have exercised an hypnotic influence upon Newton's successors. The gathering together of sun, planets and their satellites, etc., into a system which might be treated as an individual having its own history was a wonderful achievement, and it impressed men's imaginations. It served for the time as a kind of symbol of the "universe." But as compared with the entire stellar field, the solar system is, after all, only a "right little, tight little island." Yet unless its complex context be ignored the idea of "an undifferentiated universe" which, by some immanent potential force, determined everything which has happened since, could hardly arise.⁴ That the French language did not evolve out of Latin because of some immanent causality in the latter we have already noted. It is equally true that the contact and interaction of those speaking Latin with those speaking barbaric tongues were not due to the fact that they spoke Latin, but to independent variables. Internal diversity is as much a necessity as something externally heterogeneous.⁵

The consideration throws light, I think, upon the meaning of potentiality with reference to any state of things. We never apply the term except where there *is* change or a process of becoming. But we have an unfortunate tendency to conceive a fixed state of affairs and then appeal to a latent or potential something or other to effect change. But in reality the term refers to a characteristic of change. Anything changing might be said to exhibit potentiality with respect to two facts: first, that the change exhibits (in connection with interaction with new elements in its surroundings) qualities it did not show till it was exposed to them and, secondly, that the changes in which these qualities are shown run a certain course. To say that an apple has the potentiality of decay does not mean that it has latent or im-

⁴ One who turns to Spencer's chapter on the "Instability of the Homogeneous" will perceive that his proof of its instability consists in showing that it was really already heterogeneous.

⁵ Some contemporary metaphysical theories attempt to start from pure "simple" entities and then refer change exclusively to "complexes." This overlooks the fact that without internal diversification in the alleged simple entity, a complex entity would no more exhibit change than a simple one. The history of the doctrine of atoms is instinctive. Such a metaphysics transgresses the conditions of intelligent inquiry in exactly the same way as the metaphysics of ultimate origins.

plicit within it a causal principle which will some time inevitably display itself in producing decay, but that its existing changes (in interaction with its surroundings) will take the form of decay, *if* they are exposed or subjected to certain conditions not now operating upon them. Potentiality thus signifies a certain limitation of present powers, due to the limited number of conditions with which they are in interaction plus the fact of the manifestation of new powers under different conditions. To generalize the idea, we have to add the fact that the very changes now going on have a tendency to expose the thing in question to these different conditions which will call out new modes of behavior, in other words, further changes of a different kind. Potentiality thus implies not merely diversity, but a progressively increasing diversification of a specific thing in a particular direction. So far is it from denoting a causal force immanent within a homogeneous something and leading it to change.

We may say then that an earlier condition of our earth was potential with life and mind. But this means that it was changing in a certain way and direction. Starting where we must start, with the present, the fact or organization shows that the world is of a certain kind. In spots, it *has* organization. Reference to the evolution of this organization out of an earlier world in which *such* organization was not found, means something about that earlier condition—it means that it was characterized by a change having direction—that is, in the direction of vital and intelligent organization. I do not see that this justifies the conclusion that that earlier world was biocentric or vitalistic or psychic. Yet two conclusions seem to follow. One is negative. The fact that it is possible and desirable to state the processes of an organized being in chemico-physical terms does not eliminate, but rather takes for granted whatever peculiar features living beings have. It does not imply that the distinguishing features of living and thinking beings are to be explained away by resolution into the features found in non-living things. It is the *occurrence* of these peculiar features which is stated in physico-chemical terms. And, as we have already seen, the attempt to give an account of any occurrence involves the genuine and irreducible existence of the thing dealt with. A statement of the mechanism of vital and thinking creatures is a statement of *their* mechanism; an account of their production is an account of *their* production. To give such an account does not prove whether the existence in question is a good thing or a bad thing, but it proves nothing at all if it puts in doubt the specific existence of the subject-matter investigated.

The positive point is that the evolution of living and thinking beings out of a state of things in which life and thought were not

found is a fact which must be recognized in any metaphysical inquiry into the irreducible traits of the world. For evolution appears to be just one of the irreducible traits. In other words, it is a fact to be reckoned with in considering the traits of diversity, interaction, and change which have been enumerated as among the traits taken for granted in all scientific subject-matter. If everything which is, is a changing thing, the evolution of life and mind indicates the nature of the changes of physico-chemical things and therefore something about those things. It indicates that as purely physical, they are still limited in their interactions; and that as they are brought into more and complex interactions they exhibit capacities not to be found in an exclusively mechanical world. To say, accordingly, that the existence of vital, intellectual, and social organization makes impossible a purely mechanistic metaphysics is to say something which the situation calls for. But it does not signify that the world "as a whole" is vital or sentient or intelligent. It is a remark of the same order as the statement that one is not adequately acquainted with water or iron until he has found it operating under a variety of different conditions, and hence a scientific doctrine which regards iron as essentially hard or water as essentially liquid is inadequate. Without a doctrine of evolution we might be able to say, not that matter *caused* life, but that matter under certain conditions of highly complicated and intensified interaction is living. With the doctrine of evolution, we can add to this statement that the interactions and changes of matter are themselves of a kind to bring about that complex and intensified interaction which is life. The doctrine of evolution implies that this holds good of any matter, irrespective of its date, for it is not the matter of 1915, as caused by matter that has now ceased to be, which lives. The matter which was active ten million years ago now lives: this is a feature of the matter of ten million years ago.

I am, however, getting beyond my main point. I am not concerned to develop a metaphysics; but simply to indicate one way of conceiving the problem of metaphysical inquiry as distinct from that of the special sciences, a way which settles upon the more ultimate traits of the world as defining its subject-matter, but which frees these traits from confusion with ultimate origins and ultimate ends—that is, from questions of creation and eschatology. The chief significance of evolution with reference to such an inquiry seems to be to indicate that while metaphysics takes the world irrespective of any particular time, yet time itself, or genuine change in a specific direction, is itself one of the ultimate traits of the world irrespective of date.

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